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This report provides a qualitative evaluation of the dining hall environments of five different designs of small unit dining halls at Fort Lewis, Washington. Structural, design, utilities, and environmental characteristics and modernization potential are discussed.

It is concluded that the permanent dining halls constructed in 1930, 1938, 1953, and 1957 are structurally sound and could be refurbished to provide a more efficient and pleasant dining environment. It is also concluded that the 1941 wood dining halls can be improved to provide a more acceptable environment on an interim basis until new permanent EMQ's (Enlisted Men's Quarters) and dining halls are constructed.

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## FOREWORD

In 1969 the DOD Facilities and Equipment Planning Board accomplished an on site survey of military garrison feeding facilities in the United States. As a result of this survey, this Board created, with DOD approval, a project to study, define, and then implement a new, modern feeding system at Fort Lewis, Washington. As documented in the approval for this project, the objectives were to improve performance and reduce costs. This new system would then serve as a model for all military services.

In 1970 the newly created DOD Research and Development Food Program was implemented at NLABS. Included within this program was an increased emphasis on garrison feeding systems and a new requirement to study military feeding systems from a total systems concept.

In November 1970, Project Number 1J662713AJ45 Systems Studies in Military Feeding was initiated. The purpose of the project, of which this report covers only the facet concerning dining hall environment, was to increase customer satisfaction and reduce operating costs, in that order of importance. The Corps of Engineers Construction Engineering Research Laboratory, Champaign, Illinois provided technical expertise in the area of environment research and architectural engineering. The work covered in this report was conducted under interagency order AMXRED 72-110 from the U. S. Army Natick Laboratories.

It should be noted that due to the extent and complexity of the information and data which have been developed, this report is only one of a series of technical reports which will be published in the near future concerning the overall project.

*Details of illustrations in  
this document may be better  
studied on microfiche*

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## **ABSTRACT**

This report provides a qualitative evaluation of the dining hall environments of five different designs of small unit dining halls at Fort Lewis, Washington. Structural, design, utilities, and environmental characteristics and modernization potential are discussed.

It is concluded that the permanent dining halls constructed in 1930, 1938, 1953, and 1957 are structurally sound and could be refurbished to provide a more efficient and pleasant dining environment. It is also concluded that the 1941 wood dining halls can be improved to provide a more acceptable environment on an interim basis until new permanent EMQ's (Enlisted Men's Quarters) and dining halls are constructed.

## INTRODUCTION

As a result of a long standing Army policy to feed its troops in garrison in company level groups, the present Army garrison feeding system generally consists of large numbers of small dining halls having serving capacities which vary from 200 to 300 men. Each of these dining halls is a separate and distinct food service operation which predominantly depends on fresh foods prepared on site at the dining hall.

The dining facilities of the present feeding system at Fort Lewis were constructed between the years 1930 and 1957. Basically there are of four different architectural designs including both temporary and permanent construction. Each dining facility was designed to service the troops who either are housed in the same building or a building adjacent to the dining hall. Customer convenience is one of the outstanding features associated with these dining halls.

This report details the dining facilities of the present feeding system at Fort Lewis including a basic description of the facilities and the associated environment. The potential for modernizing these facilities is also presented in some detail. This report is one of three planned reports relating to environment research technical support of the feeding systems studies being conducted at Fort Lewis. The scope of work includes the development of new and improved design criteria and performance standards for military feeding system facilities to improve both worker productivity and customer satisfaction. In the process, parameters for the best utilization of available resources will also be identified.

The two subsequent reports will describe the prototypical facility designs for the proposed state of the art system at Fort Lewis, and describe the design and evaluation of test renovations at Fort Lewis, as well as report preliminary findings relative to worker productivity and customer satisfaction.

## BASIC DESCRIPTION OF FACILITIES

Dining facilities at Fort Lewis are most readily categorized according to their vintage. There are a total of 263 dining facilities of which less than 50% were being used at the time this report was written. These facilities are located in the following areas:

North Fort - Training Center Area  
 South Fort - Personnel Center Area  
 South Fort - Garrison Area  
 South Fort - Division Area

Facilities in the training and personnel areas are temporary WW II wood structures which have deteriorated to a stage where they require constant maintenance. The facilities in the garrison and division areas are primarily classified as "permanent" structures. They are concrete and masonry construction and range from 15 to 45 years in age and are structurally sound. The facilities at Fort Lewis have been constructed during or around the years shown in Table I below.

TABLE I

### Dining Hall Locations

	Area	Year of Construction	No. on Hand	
Temporary	Training Center	1941	136	
	Personnel Center	1941	21	
	Garrison	1941	19	(All scheduled for demolition)
Permanent	Garrison	1930	22	
		1938	8	
	Division	1953	47	
		1957	9	
	Stockade	1957	1	

A set of locational maps for these facilities is included in Appendix 1.



## Estimated Useful Life

The remaining life of each facility is shown in Table II and is based on Corps of Engineer estimates and climatic conditions in the Fort Lewis area.

TABLE II

### Dining Hall Life Data

	Year of Construction				
	1941	1930	1938	1953	1957
Planned Life (yr.)	20	50	50	40	40
Estimated Life <sup>1</sup> (yr.)	30-65	75-100	75-100	65-100	65-100
Useful Life <sup>2</sup> (yr.)	30	90	90	80	80
Current Age (yr.)	30	45	34	18	15
Remaining Life (yr.)	0	45	56	62	65

<sup>1</sup>Typical life ranges periodically computed and updated by the Corps of Engineers.

<sup>2</sup>Accounts for climatic conditions: 34 inches rainfall over 163 days; 16 inches snowfall over 16 days; 42-59°F average temperature range, 65% average humidity.

### Size and Seating

The character of each facility is shown in Appendix 2 which describes the layout of floor area with accompanying exterior and interior views. Since Army dining facilities have been designed on the philosophy of maintaining unit integrity, these facilities are all small in size, seating at one time between 64 and 168 men each. The space and seating, with present equipment, is shown in Table III.

**TABLE III**

**Dining Hall Space and Seating Data**

	Year of Construction				
	1941	1930	1938	1953	1957
Kitchen Dimension	24' x 33'	29' x 42'	32' x 47'	34' x 53'	35' x 59'
Kitchen Area (sq. ft.)	792	1218	1504	1855	2065
Dining Dimension	24' x 54'	36' x 48' <sup>2</sup>	34' x 47'	33' x 77'	48' x 59'
Dining Area (sq. ft.)	1296	1728 <sup>2</sup>	1588	2441	2832
Ceiling Height	8' to 12'	11'6"	11'6"	12'6"	10'5"
No. of Seats	84 <sup>1</sup>	64 <sup>1,2</sup>	64 <sup>1</sup>	128 <sup>1</sup>	168 <sup>1</sup>

<sup>1</sup>Based on standard 4-man tables.

<sup>2</sup>These items differ slightly throughout 1930 buildings.

**Construction and Materials**

Although there is a notable difference in facility size, the type of construction and the materials used vary little within each of the four areas. The 1941 temporary facilities having been constructed of wood are in very poor condition. The 1930 and 1938 facilities are constructed of concrete and concrete block and are in good structural condition. The 1953 and 1957 facilities are also constructed of concrete and concrete block and are in excellent structural condition. A comparison of the dining hall structural and interior materials by year of construction is made in Table IV.

**TABLE IV**

**Dining Hall Structural and Interior Materials**

	Year of Construction				
	1941	1930	1938	1953	1957
<b>Structural Member</b>					
Frame	Wood	Concrete	Concrete	Concrete	Concrete
Wall (ext/int)	Wood	Conc Block	Conc Block	Conc Block	Conc Block
Floor-Ceiling	Wood	Concrete	Concrete	Concrete	Concrete
<b>Finish Materials — Exterior</b>					
Wall	Wood-Painted Asbestos	Brick Veneer	Brick Veneer	Concrete Painted	Concrete Painted
Roof	Composition Shingle	N/A <sup>1</sup>	N/A <sup>1</sup>	Tar and Gravel	Tar and Gravel
<b>Finish Materials — Interior</b>					
Wall-Kitchen	Gypsum Board Painted	Plaster Painted	Glazed Tile	Glazed Tile	Glazed Tile
Wall-Dining	Gypsum Board Painted	Plaster Painted	Plaster Painted	Conc Block Painted	Conc Block Painted
Ceiling-Kitchen and Dining Room	Exposed Rafters	Concrete Painted	Concrete Painted	Concrete Painted	Concrete Painted
Floor-Kitchen	Concrete	Quarry Tile	Quarry Tile	Quarry Tile	Quarry Tile
Floor-Dining	Asphalt or Vinyl Asbes Tile	Asphalt Tile	Asphalt Tile	Asphalt or Vinyl Asbes Tile	Asphalt Tile

<sup>1</sup> First floor of 3 floor building.

## Facility Design

Facilities are related to troop living quarters (EMQ's) in various ways. The newer permanent living quarters are three stories in height with one story dining structures attached. The older structures are also three stories in height, but the dining facility is integrated into the first floor. Location of entrances into the dining facilities vary. Additional space is also available adjacent to the dining hall for possible expansion in the 1930, 1938 and 1953 vintage structures. There is accessibility under most of the floors, which would ease relocation of plumbing and wiring required to service new equipment in the kitchen and dining area. Pertinent facility characteristics are described in Table V below.

TABLE V

	Facility Characteristics				
	Year of Construction				
	1941	1930	1938	1953	1957
Separate Facility	X				
Attached to EMQ				X <sup>1</sup>	X <sup>1,2</sup>
Integrated w/EMQ		X	X		
Access under Kitchen Floor	Limited	Full	Full	Full	Full
Access under Dining Floor	Limited	Full	Full	Limited	None
Kitchen Entrance	Outside	Open Porch	Open Porch	Svc Dock	Svc Dock
Adjacent Space Area (sq. ft.)	None —	15' x 41' 516	15' x 45' 840	None —	None —
Dining Hall Entrance	Outside	Hallway/ Dayroom	Hallway/ Dayroom	Outside/ Dayroom	Outside/ Hallway
Adjacent Space Area (sq. ft.)	None —	36' x 32' <sup>4</sup> 1152	32' x 37' <sup>4</sup> 1184	37' x 62' 2294	None —
Expansion Potential	No	Yes <sup>3</sup>	Yes <sup>3</sup>	Yes <sup>3</sup>	No

<sup>1</sup>Mechanical Equip Rm Below Kitchen.

<sup>2</sup>Dayroom Above Dining Area but not Kitchen.

<sup>3</sup>Depending on whether Dayroom can be used for multiple purposes.

<sup>4</sup>Some of these Dining Halls have no Adjacent Space.

## Supply Loading Provisions

The kitchen entrance characteristics for off loading of supplies to the various dining halls are shown in Table VI below.

TABLE VI

### Dining Hall Supply Loading Provisions

	Year of Construction				
	1941	1930	1938	1953	1957
Supply Door	60"	42"	42"	60" <sup>1</sup>	60" <sup>1</sup>
Width and (Type)	(double)	(single)	(single)	(double)	(double)
Loading Dock	No	Porch	Porch	Yes	No
Kitchen Floor					
(above ground)	2 ft.	3 ft.	3 ft.	4 ft.	Ground level

<sup>1</sup> Double set of double doors with vestibule between.

## Utilities

Utilities available at the various dining halls are shown in Table VII. It should be pointed out that the existing electrical systems in the 1930, 1938 and 1941 vintage dining halls have no additional capacity to be utilized if more powerful food service equipment or if more environmental control equipment is desired. The only alternative is to install new electrical systems including transformers, internal distribution and rewiring. Since natural gas is not generally available, all equipment must be electrically powered.

TABLE VII

### Dining Hall Utilities

	Year of Construction				
	1941	1930	1938	1953	1957
Electrical Power	Yes <sup>2</sup>	Yes <sup>2</sup>	Yes <sup>2</sup>	Yes <sup>1</sup>	Yes <sup>1</sup>
Water	Yes	Yes	Yes	Yes	Yes
Sewer	Yes	Yes	Yes	Yes	Yes
Gas	No	No	No	No	No
Steam	No <sup>3</sup>	Yes	Yes	Yes	Yes

<sup>1</sup> Capacity can be increased to fewer operating facilities if such facilities are equally distributed throughout the area.

<sup>2</sup> New transformer and distribution systems required for any additional power.

<sup>3</sup> Steam supply would be adequate if dishwashing operation is eliminated.

## DESCRIPTION OF THE ENVIRONMENT

### Safety

The permanent structures are considered fire resistant; however, the temporary wood structures are not. Emergency exits are marginal in some of the 1930 buildings with some of the exterior doors having been permanently closed. The exit doors in the 1930 and 1938 buildings are generally not marked by lighted signs, and swing in instead of out. Many of the exits in the 1953 buildings barely meet DOD criteria for dead ends. Also, exit doors are located only at the kitchen end of the facility. Quarry tile floors in kitchen areas of all dining halls were generally found to be slippery, especially around sources of grease-splatter. The asphalt floors in the dining areas are also very smooth and could cause a safety hazard. All facilities except the 1957 vintage require the use of steps for entry from the outside. Safety characteristics are shown in Table VIII below.

TABLE VIII

#### Dining Hall Safety Features

	Year of Construction				
	1941	1930	1938	1953	1957
Fire Resistant Exits — No. and Type	No	Yes	Yes	Yes	Yes
Kitchen	1 double	1 single	1 single	1 double	1 double
Dining	2 single/ 1 double	1 double/ 1 double <sup>1</sup>	1 double <sup>1</sup> / 1 double <sup>2</sup>	1 double/ 1 double <sup>1</sup>	2 single/ 1 double <sup>2</sup>
Direction of Swing	out	in	in	out	out
Lighted Exit Signs	No	No	No	Yes	Yes
Max Travel to Exit <sup>3</sup>	30'	32'	32'	70'	25'
Dead End to Exit <sup>4</sup>	10'	32'	32'	70'	25'

<sup>1</sup> To interior — dayroom.

<sup>2</sup> To interior — hallway.

<sup>3</sup> DOD Criteria is 125 feet maximum.

<sup>4</sup> DOD Criteria is 75 feet maximum.

## Comfort

Generally, the interior environments in these facilities are very similar in regard to physical comfort. Due to the temperature climate in the Fort Lewis area, air conditioning is not authorized and there are no air cooling or humidity control systems in any of the Fort Lewis dining facilities. Ventilation is accomplished by opening windows. The kitchen area is ventilated by exhaust hoods, some of which are inadequate. Spaces are heated by steam radiators, except in the 1941 buildings which are heated by small unit heaters. Because of the large openings in the walls between the kitchen and dining areas of most facilities, heat, humidity, odors, smoke and grease particles can be easily transferred from the kitchen to the dining area, especially where exhaust systems are inadequate or functioning improperly. This condition can also cause air drafts through the dining area appreciably changing temperatures and "comfort stability".

Illumination is a problem in both the control of brightness and in the type of lighting used. In the 1941, 1930, and 1938 buildings, industrial type fluorescent lamps are predominantly used. Whereas incandescent lamps are recommended for food serving and dining areas not only for their natural daylight effect, but also for their adaptability to (variable inductance) brightness control. The 1953 and 1957 buildings use incandescent lamps but have no brightness control; and, there is little control, if any, over exterior daylight, except for curtains, and they are usually skimpy and poorly hung.

Noise is a serious problem due to predominance of hard surfaces in both the kitchen and dining area. Decibel readings range between 10 to 15 db over recommended levels for dining areas. A comparison of the environment control features of the various types of dining facilities is shown in Table IX. Exact measurements of temperature, humidity, sound and light levels, and their fluctuations over time will be included in a follow-on report.

**TABLE IX**

**Dining Hall Environment Control Features**

Features	Year of Construction				
	1941	1930	1938	1953	1957
Temperature Control	Heat	Heat	Heat	Heat	Heat
Humidity Control	No	No	No	No	No
Acoustic Control	No	No	No	No	Partial
Background Music	No	No	No	No	No
Illumination Control	No	No	No	No	No

**Appearance**

Reference should be made to the interior and exterior views shown in Appendix 2. Unattractive interiors at Fort Lewis are tied to the traditional concept that hard shiny surfaces and institutional colors are most desired, apparently for ease of cleaning. There are few bright colors, or soft materials such as carpet, full drapery, upholstered furniture, or acoustic ceilings. Furniture is of a standard design with no variety in color or style. Present wall decor adds visual clutter and disorder, and ranges from homemade fireplaces to huge poorly executed murals. It is far from the accepted standards of commercial or university facilities, or the facilities of the other military services. Views to the outside do exist, but are not generally of a very good quality. Most have a direct view into the kitchen preparation area from the dining area. In the kitchen area itself, there is little visual relief for workers — poor exterior views, glazed walls, white ceiling, colorless equipment, etc.



The exterior appearances of dining facilities at Fort Lewis are generally uninviting. Entrances are ill defined or obtained through other parts of the building. There is little physical identity, as a dining facility, except for the kitchen exhausts, docks and their exterior shapes. A comparison of the interior and exterior appearances of the various dining halls is shown in Table X.

**TABLE X**

**Comparison of Dining Hall Interior and Exterior Appearances**

	Year of Construction				
	1927	1930	1938	1953	1957
Defined Entrance	Yes	No	No	Yes	No
Exterior Colors	Tan/Wht/Pink	Dk Red	Dk Red	Lt Green	Tan
Interior Colors					
Kitchen	White	Wht/Green	Wht/Tan	Wht/Tan	Wht/Tan
Dining	Varies	Varies	Varies	Varies	Varies
Sight Control Into Kitchen	Partial	No	Yes	No	Partial
Exterior Views					
Kitchen	Marginal	Poor	Poor	Poor	Poor
Dining	Marginal	Marginal	Marginal	Good	Poor <sup>1</sup>

<sup>1</sup> Looks out on parking lot with military vehicles.

## Convenience

The convenient locations of the dining facility at Fort Lewis in relation to the EMQ's is perhaps one of the most important advantages associated with the present feeding system. However, customer convenience inside these facilities is a problem. Reference should be made to the typical facility layouts shown in Appendix 2. Circulation into the facility, through the serving line, into the dining area and then out of the building is generally hampered. This is primarily due to lack of modern serving and dispensing equipment, time consuming head-count procedures, and poorly conceived circulation flows forced by the present layout of equipment. In most facilities, there is inadequate entry or queuing space and customers are required to sometimes wait outside in the elements. Upon leaving, customers must pass through the flow of others entering the serving line in order to deposit dirty trays at the dishwashing window. The haphazard addition of beverage dispensers, equipment to dispense china service, and the introduction of short-order service has further complicated the problem. Restroom facilities for kitchen workers, required by DOD criteria, are not available in some facilities. Customer latrines are absent from all facilities, except where located in the EMQ area. Offices and adequate janitor closets are also lacking in most facilities. A comparison of features affecting customer convenience is made in Table XI.

TABLE XI

### Dining Hall Customer Convenience Features

	Year of Construction				
	1941	1930	1938	1953	1957
Queuing Space	Inadequate	Marginal	Marginal	Inadequate	Inadequate
Ease of circulation	Marginal	Marginal	Hampered	Hampered	Marginal
Check-in Counter	No	No	No	No	No
Kitchen Restroom	No	No	No	Yes	Yes
Customer Restroom	No	No	No	No	No
Janitor Closet	No	No	No	Yes	Yes
Water Fountain	No <sup>1</sup>	Yes <sup>2</sup>	Yes <sup>2</sup>	No <sup>1</sup>	No <sup>1</sup>
Office	No	No	No	Yes	Yes

<sup>1</sup>Water fountains have been replaced by beverage dispensers some of which do not have water outlets.

<sup>2</sup>In adjacent hallway.

## **Dining Hall Modernization Potential**

Many of the dining halls at Fort Lewis are in sound structural condition and would lend themselves to modernization at a much lower cost than would be required to construct new facilities. This section covers the renovation potential of the 1930, 1938, 1953 and 1957 dining halls which are permanent structures. The 1941 wood dining hall should only be considered for short term use due to its deterioration and obsolescence.

### **Electrical, Water and Sewerage**

All facilities, renovated, must be distributed as equally as possible throughout each of the respective areas to provide better utilization of electrical capacities at minimum costs. Under current plans to down-rate barracks capacities, fewer than 50% of the existing dining facilities should be required in each area. Location of those facilities required must be closely coordinated with the Fort Lewis Directorate of Facilities Engineering to insure the best distribution for power supply. In the older structures, 1930, 1938, 1941, new electrical systems may be required, including transformers, internal distribution and rewiring if present power requirements are exceeded. The water supply and sewerage capacity of all dining facilities are considered adequate and should not require major improvements.

### **Service and Supply**

Most facilities are raised above ground level. Truck supply could necessitate the leveling or ramping of floors in the unloading and kitchen areas. Maneuver space for large trucks is limited at most sites. Docks may require enlargement depending on the type of supply operation. The 1957 vintage building has no dock and the space for ramping is also limited. Such a problem may require a solution in the trucking equipment, e.g., hydraulic lifts.

### **Safety**

Safety problems are not considered significant but do require attention. Most important is the assurance of adequate exits and exit marking. Exits that have been closed may require opening, and door swings may have to be reversed. The maximum distance from an exit should not exceed 125 feet. Dead ends should not exceed 75 feet and there must be two (2) means of exit. Where needed, steps will require enlargement. Adequate safety treads and proper lighting will also be required. Slip resistant quarry tile should be installed in those areas of spillage or grease splatter in the kitchen, and on the serving line. Carpet, recommended by DOD standards, would improve safety in the dining area; however, static resistant carpet should be used.

## Convenience

When the customer has a choice of whether or not to come to the facility to eat, convenience is a major consideration. Therefore, dining hall location is an important factor. Convenient location of facilities is made even more demanding by the weather in the Ft. Lewis area where precipitation is recorded on 179 days out of the year. This further requires adequate vestibule and queuing space inside. The addition of convenient restrooms, especially for wash-up, should be carefully considered. DOD criteria requires restrooms for employees, one each for men and women in the larger facilities. With increasing emphasis upon multi-use of dining facilities, and with an increasing number of women in the military, both male and female restrooms should be provided in the customer area. Convenience is also hampered by circulation conflicts in the serving line area. The use of the dirty tray "window" in most of the facilities causes a considerable amount of cross-circulation between people entering and leaving the dining area. This could be resolved by placing mobile dirty tray units in the dining area for loading by the customer as he leaves. The unit could then be unloaded later at the scullery. Other conflicts can be resolved and flow rates improved by proper planning of serving line equipment and layout.

## Comfort

Complete air conditioning would best improve comfort through temperature and humidity control. However, this equipment is of marginal value in the Ft. Lewis area where the temperature varies, on an average, between 42 and 59°F. Extremes of 0 and 99°F. have been noted with humidity as high as 83% but these conditions do not exist over long periods of time. One could expect that when such extremes are approached, the feeding facilities would become very uncomfortable places to be in, especially in the kitchen area. Adequately sized and properly maintained exhaust hoods in the kitchen area are essential to control heat, smoke and odor. Exhaust systems which discharge cooled air back into the kitchen should be considered for worker comfort. Improvement of comfort in the dining area could also be made by controlling or closing the openings in the wall between the dining and kitchen area.

## Lighting

Controlled, soft and diffused lighting is an important factor in the comfortability of a space. Illumination controls, nonexistent at present, should be provided by the installation of simple rheostatic switches. Incandescent luminaires are recommended for the dining area. The color of this light adds to the appearance of food and can be less expensively controlled by rheostats. It is not necessary to provide a high intensity of light for dining, but it is desirable to vary light from noon to evening, and to have reasonable brightness for cleaning. Devices such as "swags" and light tracks that provide an orifice for luminaires to plug into should be considered. These devices can feed off existing fixture outlets, and allow for the addition of one or two lower wattage luminaires to spread out and direct the light. Proper drapery applications can readily solve the problem of light control from exterior sources. Drapery, if 150% to 200% full, will provide an excellent filter of sunlight and is more pleasing to the eye than mechanical blinds. Wood shutters are very adaptable to the small windows of the old buildings and should provide excellent light control.

## Acoustic Comfort

Noise is a common condition in the dining facilities at Ft. Lewis. It can be most readily controlled by the application of softer surfaced material where possible. Some acoustic softening will come with the application of carpet, drapery and acoustic ceilings as recommended by DOD criteria. Additional acoustic absorbants could be added in the form of furniture and accessories, such as padded booths and chairs and special "tuner" panels faced with visual enrichment. Background music can also be provided to mask noise. The most difficult problems will exist in the kitchen area where acoustic treatments are difficult for sanitary reasons. The centralization of dishwashing, however, would significantly reduce the kitchen noise level. Further test data on acoustics in dining facilities will be covered in a subsequent report.

## Appearance

Interiors at Ft. Lewis lack visual order and coordination. The application of color, in the form of paint, is the least expensive remedy to the appearance problem. However, the color selection and coordination should be accomplished by professionals. Color application can psychologically lower ceilings, shorten or lengthen spaces, and make one feel warm or cold. Combination of colors must be carefully designed to coordinate paint, carpet, drapery and furnishings. Visual "tuner" panels, color graphics and real-life pictures,

should be used to add human scale and enrichment. Applied to sound absorbant material, they would also serve as acoustic controls. Use of military posters, or cosmetic decorations is not recommended. Further improvements in appearance can be accomplished with moveable partitions to screen undesirable views, such as into the kitchen area. Partitions will also subdivide space into smaller more personal dining areas. By making careful combinations of visual features, distinctive and pleasant places can be economically created to better satisfy the customer.

### **Flexibility**

A dining facility will be more flexible if the components within are relatively free for movement into different arrangements for different purposes. Space divided and formed by moveable partitions can be changed and reshaped for different uses. Table shapes and sizes can add to dining hall flexibility. For example, a two-man table placed beside a four-man table will make a table for six, etc. Systems of lighting such as the plug-in track system are also adaptable to dining hall flexibility, i.e. they allow for a change of lighting accent for different purposes at different times. Changeable "tuner" panels could provide other degrees of flexibility, both visual and acoustic.

### **Expansion of Seating**

It is generally concluded that seating capacities can be either maintained at or raised to an acceptable level although a greater percentage of floor space would be taken over by mobile serving line equipment required to provide improved service. Expansion into adjacent dayroom space is possible in 1930, 1938 and 1953 vintage buildings. This would provide a multipurpose space for both dining overflow and dayroom activities. In the 1930-1938 facilities, the issue would not be critical since other dining spaces would be vacated in the same building for dayroom functions. In the 1953 facilities, it is the only space available for customer restrooms and adequate vestibule or queuing space. In these facilities, only a portion of the overall dayroom space need be used. This could provide added flexibility and increase customer convenience for both dining hall customers and dayroom users.

## CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the 1930 and 1938 facilities which have 45 and 56 years of life remaining, respectively, and the 1953 and 1957 facilities which have 62 to 65 years of life remaining, respectively, are structurally sound and can be modernized to provide an efficient and attractive cafeteria environment.

It is also concluded that the temporary 1941 wood dining halls can be improved to provide a more acceptable environment on an interim basis until new permanent EMQ's and dining halls are constructed. Long range utilization of these facilities is not recommended due to their age. The construction of new permanent dining halls should be phased in with longer range EMQ replacement plans for Fort Lewis.

It is recommended that the scope of any dining hall renovation program be designed to convert these facilities into efficient and attractive establishments, certainly not more than would be associated with a modern commercial cafeteria. Emphasis should be directed towards the type of renovation (i.e., carpeting, painting, drapes, movable partitions, and selected furnishings) which achieve practical improvements at a modest cost.

### References

Dept. of Army, Empirical Cost Estimates for Military Construction and Price Adjustment Factors, AR 415-17, Hq. Dept. of Army, Washington, D.C., 25 Nov 1970.

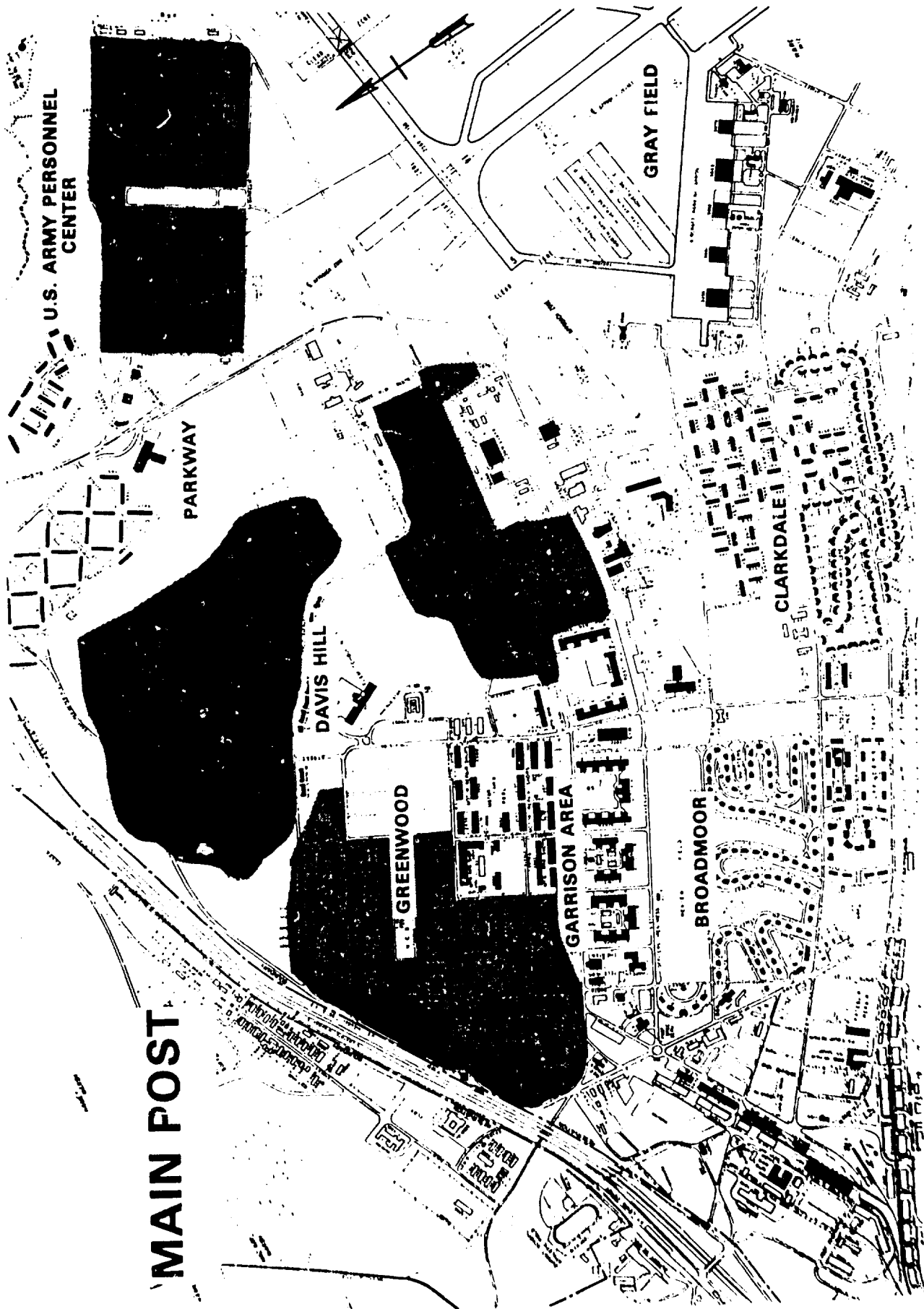
Dept. of Army, Minor Construction, AR 415-35, Hq. Dept. of Army, Washington, D.C., 16 July 1970.

Dept. of Defense, Construction Criteria Manual, DOD 4270.1-M, Office of Asst. Sec. of Defense for Installations & Logistics, 1 March 1968.



**Appendix :**

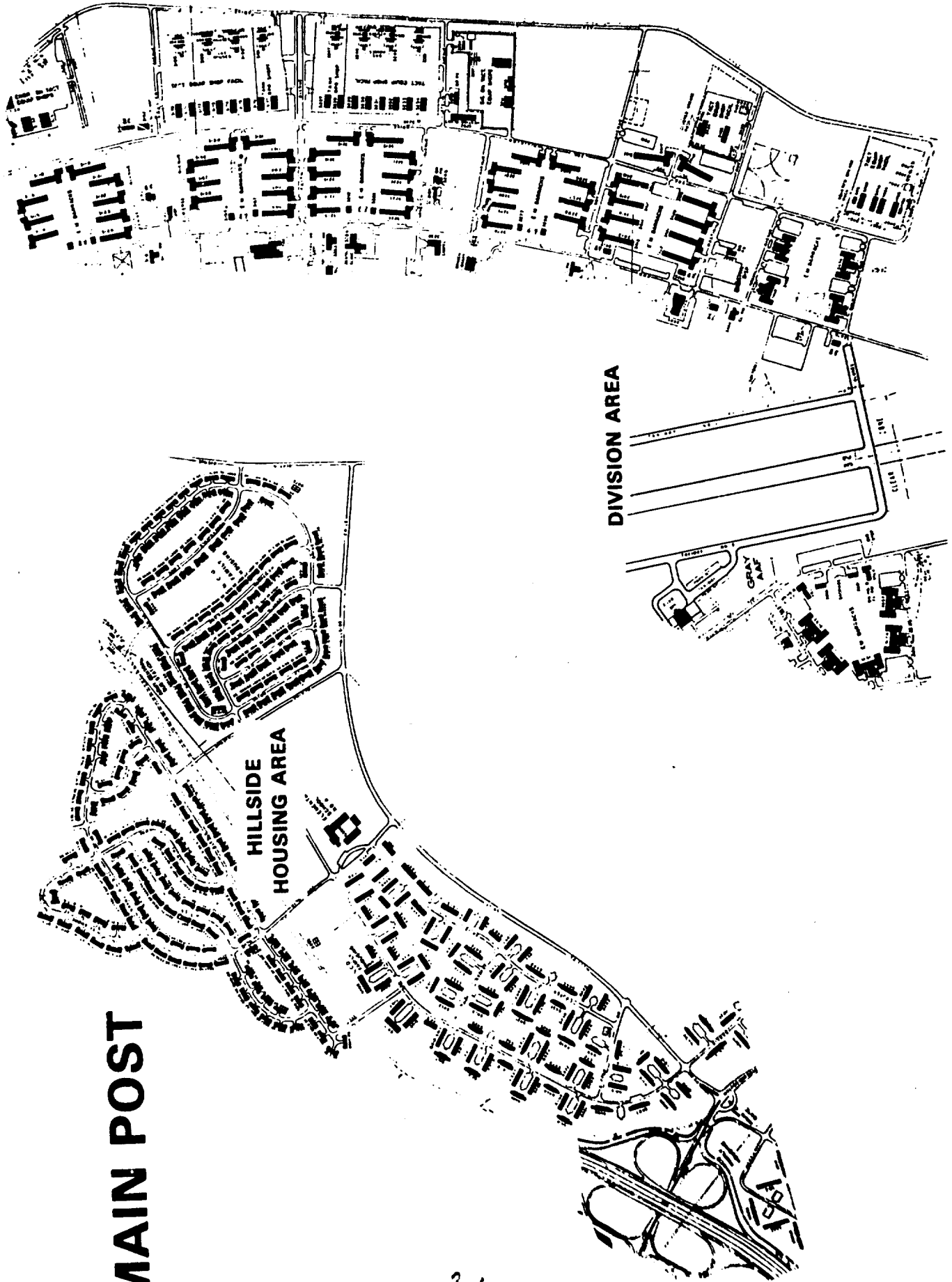
**General Site Maps of Fort Lewis**



# MAIN POST

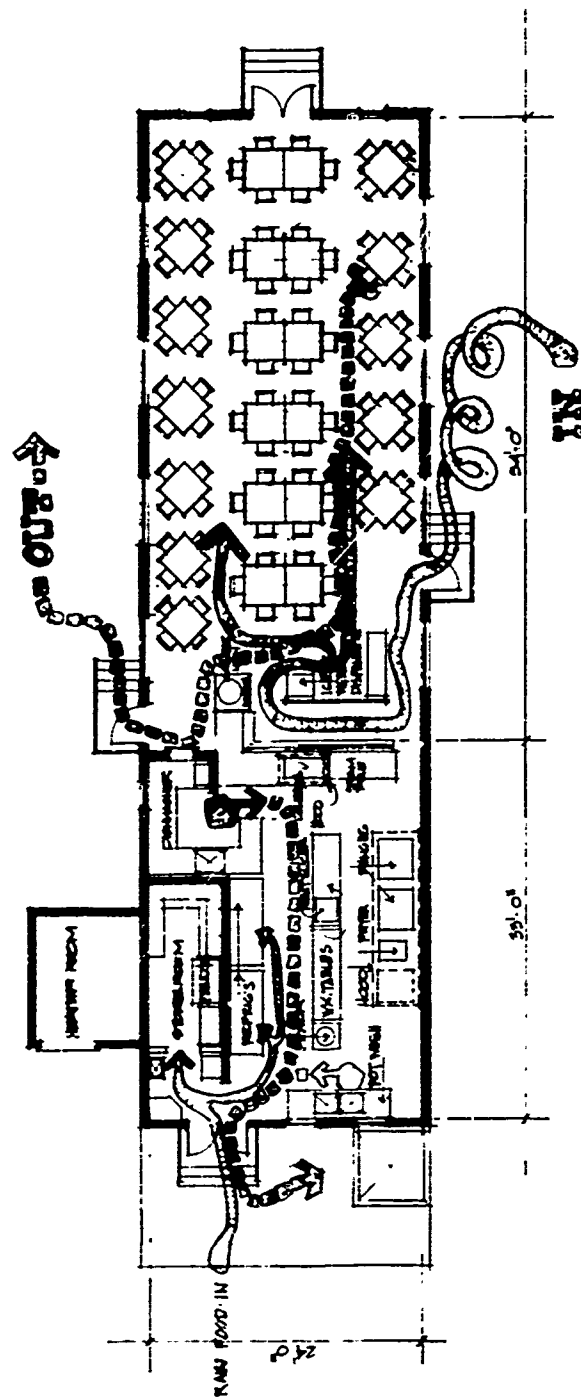
HILLSIDE  
HOUSING AREA

DIVISION AREA



## **Appendix 2**

### **Layouts and Photographs of Typical Dining Halls**



EXISTING-1941 FACILITY

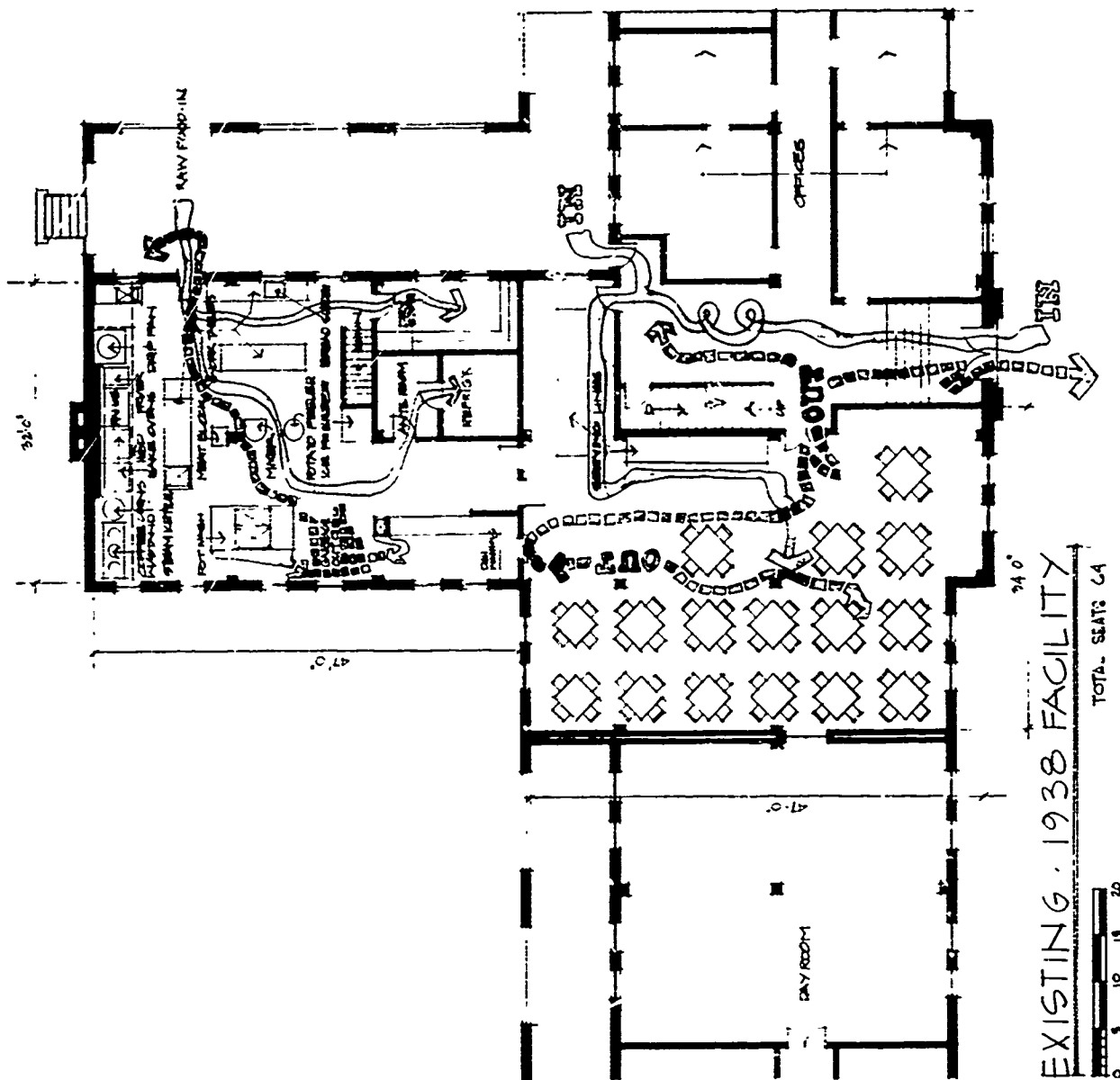
16	20
TOTAL SEATS 84	



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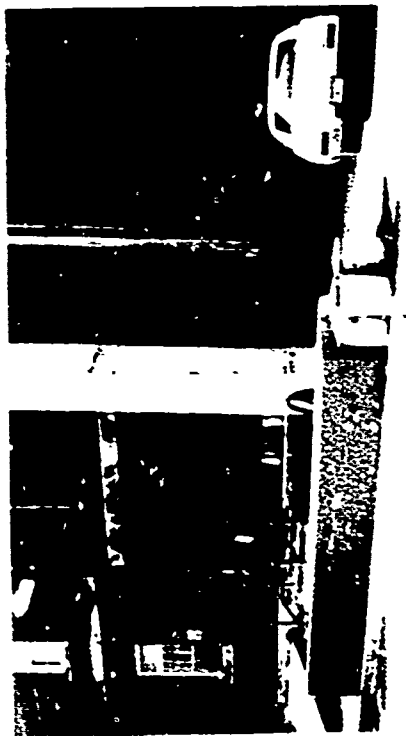
1941 Temporary Dining Hall Exterior and Interior Views



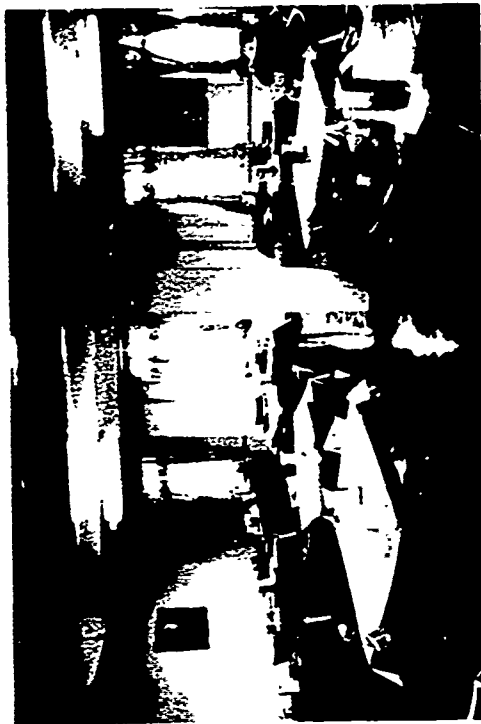
EXISTING - 1938 FACILITY

TOTAL SEATS 64



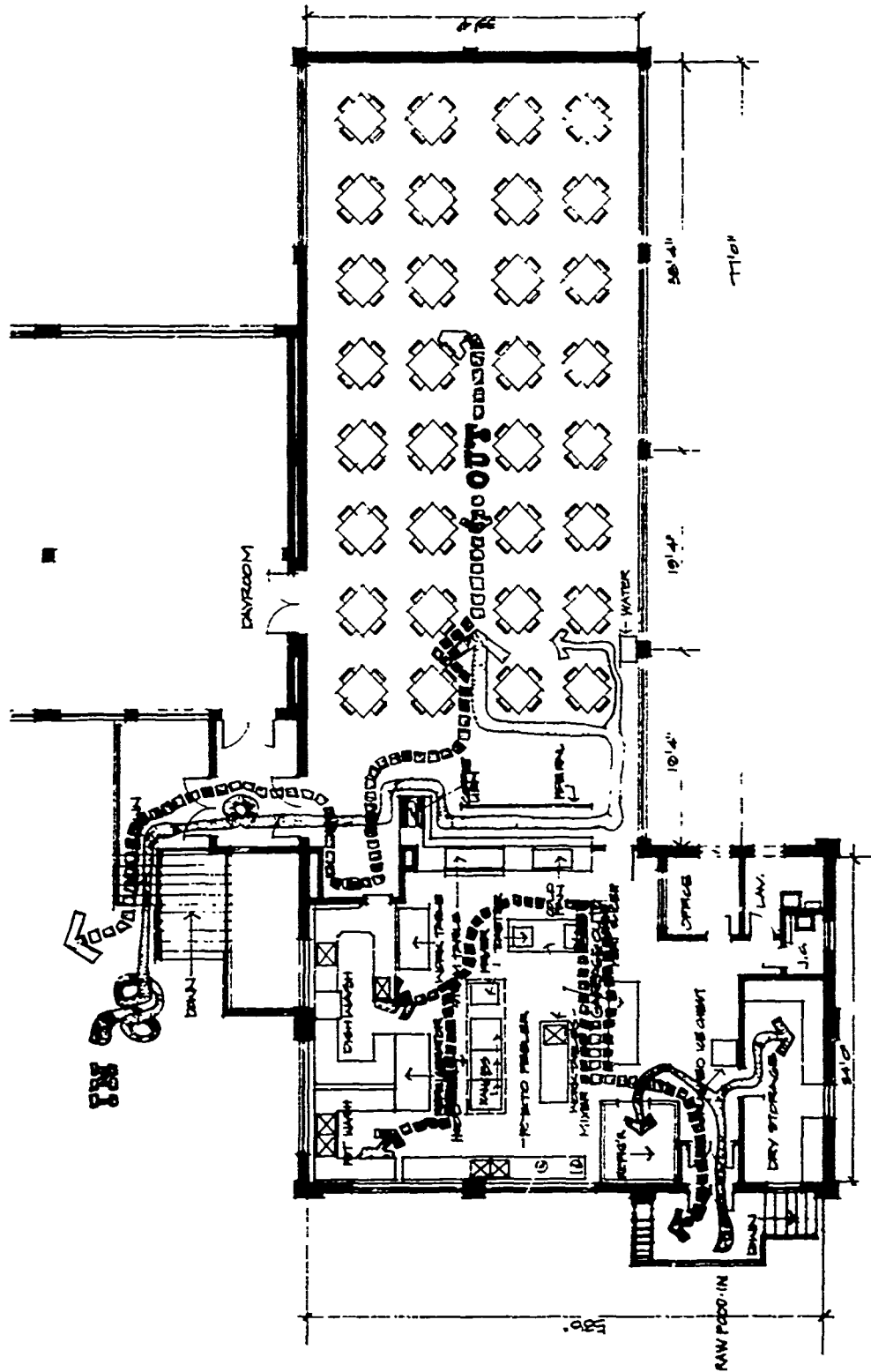


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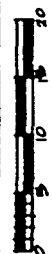
1930 Dining Hall Exterior and Interior Views

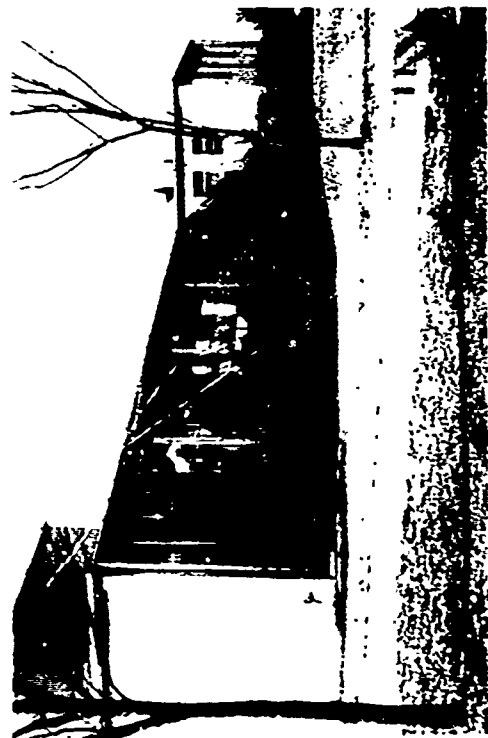




EXISTING - 1953 FACILITY

TOTAL SEATS 128

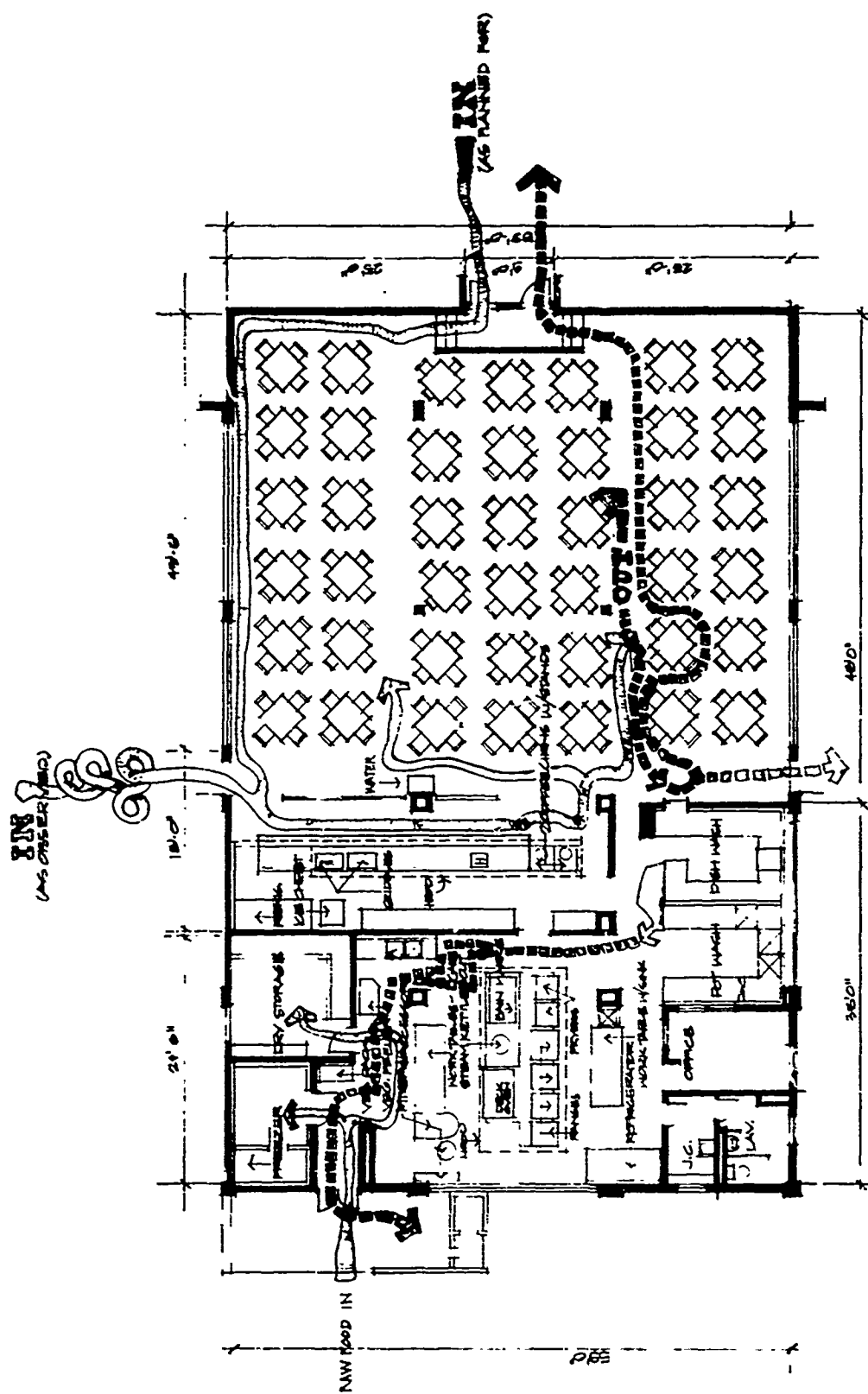




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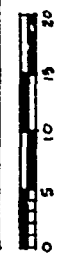


1953 Dining Hall Exterior and Interior Views



EXISTING - 1957 FACILITY

TOTAL SEATS 108





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1957 Dining Hall Exterior and Interior Views